

Exploration of New Upper Ocean Circulation Dynamics through Synergy of the SWOT Mission and a 1/30° OGCM

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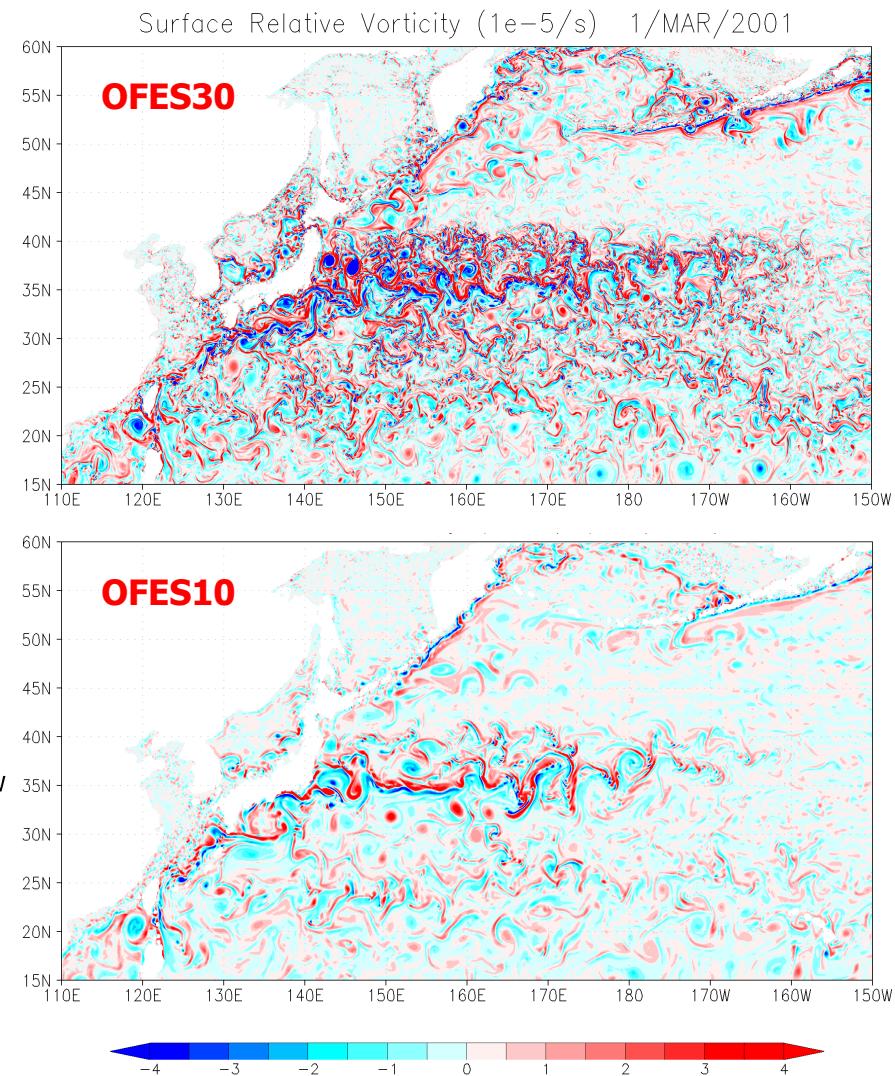
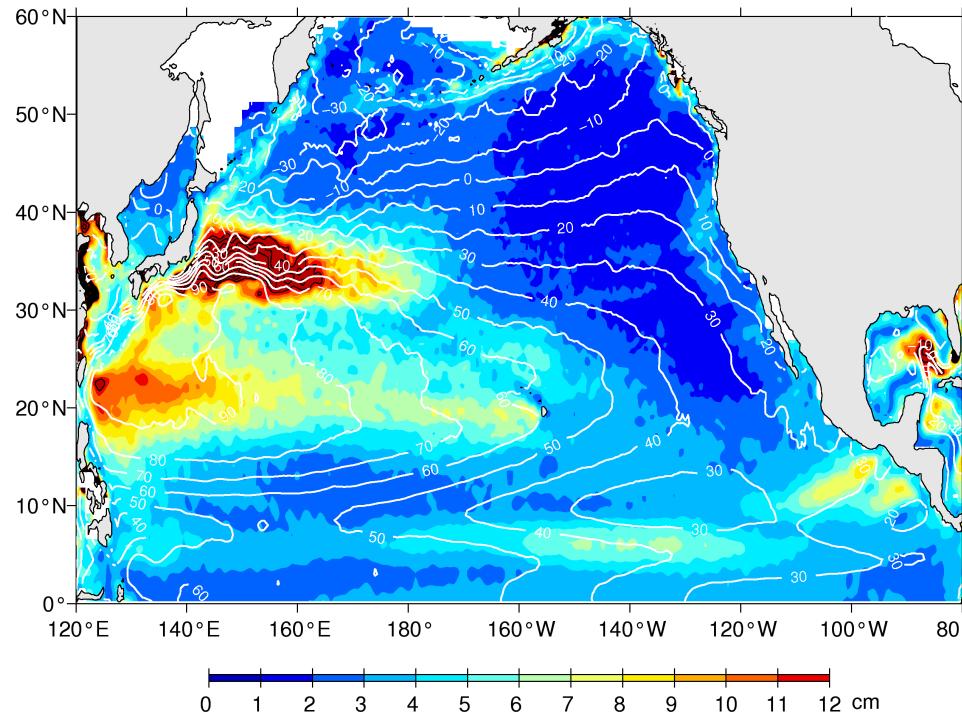
Overall Objectives:

- Aid evaluation of SWOT mission science preparation by analyzing spatio-temporal variability of SSH and surface velocity signals in the Earth Simulator Center's 1/30° North Pacific OGCM.
- Explore new upper ocean dynamics at the SWOT resolution by combining OGCM output, high-resolution SST imagery and ship-board ADCP data.

Analysis Tools:

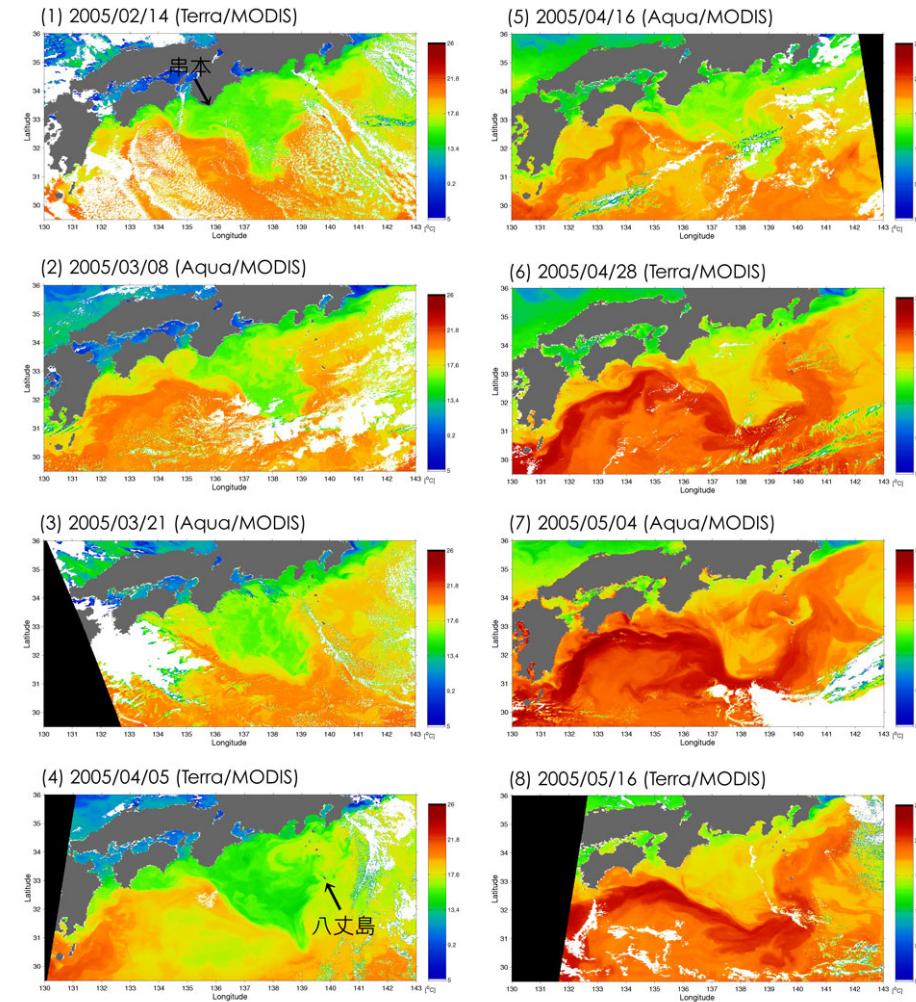
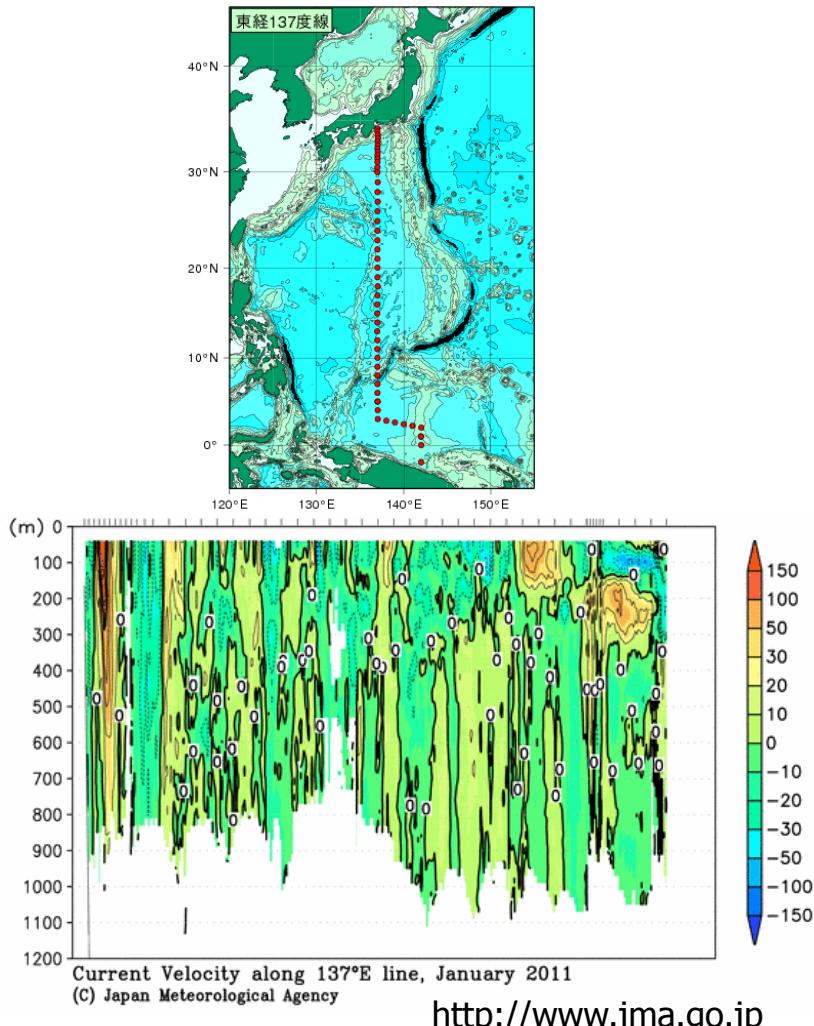
- ESC 1/30° North Pacific OGCM: see Sasaki and Klein (2012, JPO);
100 levels in vertical & 60 in upper 500m;
1/10° OFES output available for comparison.

AVISO rms SSH variability in the North Pacific Ocean



Analysis Tools:

- Repeat hydrography/ship-board ADCP measurements along 137°E by JMA available quarterly from 2005 to present
- High-resolution MODIS SST data from Terra/Aqua satellites

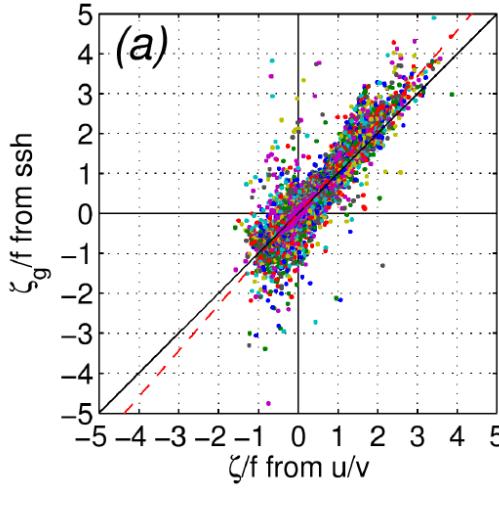


Specific Questions:

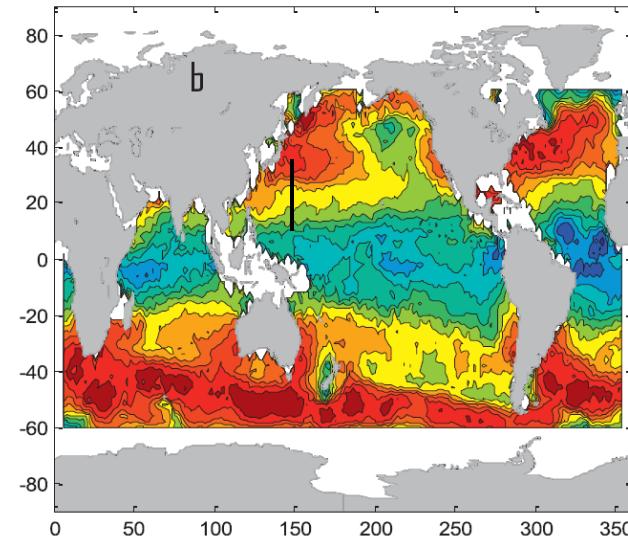
- SSH and surface geostrophic/ageostrophic current**
Can SWOT SSH data be used to improve surface velocity estimation at where $\text{Ro} \sim O(1)$?
- Cyclonic vs. anti-cyclonic vorticity asymmetry**
- SSH/SST and EKE spectral slopes in different frontal regions**
- Spectral energy transfers in mesoscale and sub-mesoscale ranges**

Approaches:

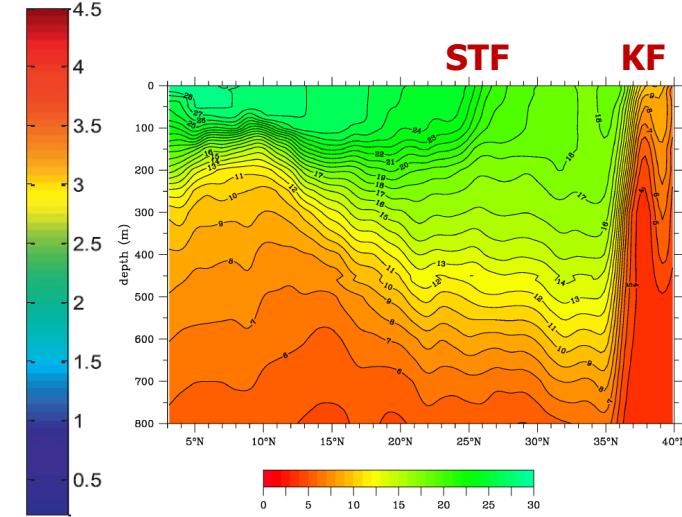
- SWOT measurement errors:** Explore how the errors impact on dynamic properties listed above; utilize this exploration to help SWOT mission planning
- Two dynamically distinct frontal regions:** Kuroshio Front vs Subtropical Front



OFES30 surface vorticity



Spectral slope in 7-250km band (Xu & Fu 2012)



$T(y,z)$ along 144°E in N Pacific